REMARKS

Applicants respectfully request consideration of the subject application. This Response is submitted in response to the Office Action mailed April 7, 2006. Claims 1-6 stand rejected. In this Amendment, claims 1, 4 and 5 have been amended and claims 7-24 have been added. No new matter has been added.

35 U.S.C. §§ 102 and 103 Rejections and New Claims

The Examiner has rejected claims 1, 3 and 4 under 35 U.S.C. § 102(b) as being anticipated by Seeber, et al. (U.S. Patent No. 5,314,714, hereinafter "Seeber"). The Examiner has rejected claims 1-5 under 35 U.S.C. § 102(e) as being anticipated by Dunand, et al. (U.S. Patent No. 6,630,427, hereinafter "Dunand"). The Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Dunand.

As noted above, Applicants have added new claims 7-24.

Applicants respectfully submit the cited art fails to teach or suggest, inter alia, as claimed in independent claim 1 and new claims 7, 13 and 19: "an unbroken section of the conductive material being located sufficiently close to a plurality of the particles to be driven to a superconductive state by the superconductive material." Similar limitations are included in independent claim 4 and new claims 10, 16 and 22.

Applicants respectfully submit the cited art fails to teach or suggest, *inter alia,* as claimed in claim 1: "gallium being prepared to have a structure that has the highest lambda value." A similar limitation is included in independent claim 4.

Applicants respectfully submit the cited art fails to teach or suggest, *inter alia,* as claimed in new claim 7: "the gallium being amorphous." A similar limitation is included in independent claim 10.

Applicants respectfully submit the cited art fails to teach or suggest, *inter alia,* as claimed in new claim 13: "a conductive material... at least including 20% by volume gallium". A similar limitation is included in independent claim 16.

Applicants respectfully submit the cited art fails to teach or suggest, *inter alia,* as claimed in claim 19: "a conductive material selected to be driven to a superconductive state at an operating temperature of at least 20K when in proximity to the superconductive material and at least including gallium." A similar limitation is included in independent claim 22.

Although Seeber and Dunand teach using gallium with superconductors, neither Seeber nor Dunand teach or suggest preparing the gallium to have the highest lambda value, preparing substantially amorphous gallium, or using at least 20% <u>by volume</u> gallium. Further, neither Seeber nor Dunand teach or

suggest a superconductor in which the conductor is induced to be superconducting through the proximity effect.

As disclosed in the present specification at paragraphs [00177] and [00178], gallium is known to exhibit polymorphism and gallium can be made to be amorphous. The different forms of gallium can have substantially different lambda values.

Further, as disclosed in the specification at paragraph [0076], the conductor (e.g. gallium) is preferably susceptible to the superconducting proximity effect. In order to be susceptible to the proximity effect, the conductor preferably has a high-electron-boson coupling coefficient (i.e. high lambda value). In addition, as disclosed in [0084], with reference to Figure 4, the superconducting gap magnitude in the conductor is relatively large when the lambda value is high. This results in the conductor having a larger critical current density extending deeper into the metal layer.

Further, as explained in [0085], in the present invention, the superconducting particles are superconducting at the operating temperature, and the metal matrix material (i.e. the conductor) is induced superconducting through the superconducting proximity effect, even though its intrinsic superconducting transition temperature may be below the operating

temperature. The proximity effect is illustrated in Figures 5 and 6. One factor that affects the proximity effect is the lambda value.

Neither Seeber nor Dunand teach or suggest the proximity effect or the desirability of preparing a conductor to have a lambda value to improve the proximity effect, and thus improve the critical current density of the superconductor/metal matrix composite.

Dunand is directed to a superconducting phase that includes a percolative pathway (i.e. the superconducting particles are touching) to establish a high critical current density. In contrast, as explained in [0086] of the present invention, the superconducting particles of the presently claimed invention are coupled by a continuous superconducting path due to the proximity effect (i.e. the superconductor particles are not necessarily touching). This coupling of the superconducting particles via the proximity effect serves to establish a high critical current density superconducting pathway in the superconductor/metal matrix composite of the presently claimed invention. Dunand, therefore, teaches away from the presently claimed invention, which is a proximity effect superconductor.

Neither Seeber nor Dunand teach or suggest using at least 20% by volume gallium. Seeber discloses using 0.5 – 20% by weight gallium. However, a superconductor that includes at least 20% by volume is the equivalent of

approximately 37% by weight gallium. Figure 44 of the present specification illustrates the increased performance with respect to current density for 20% by volume gallium. As described in paragraph [00102] of the present specification, the higher the lambda of the conductive material, the higher the optimum volume % of conductive material required to achieve the maximum critical current density. In other words, as the lambda of the metal matrix increases, the optimum volume %, with respect to the critical current density, also increases. At some volume % metal matrix, however, the critical current density decreases dramatically as the range of the superconducting proximity effect, described in paragraph [0086], becomes shorter than the distance between the superconductor particles. In high volume % (i.e. > 50%) composites, the superconducting path is very weakly coupled due to the proximity effect.

Seeber discloses that the operating temperature for their superconductor is 4.2K (liquid helium temperature). In contrast, in the presently claimed invention, the superconductor particles are superconducting at the operating temperature, and the metal matrix material is induced superconducting through the superconducting proximity effect, even if the intrinsic superconducting transition temperature of the metal matrix material is below the operating temperature. See, for example, paragraph [0085] and Figure 44.

Thus, neither, Seeber, Dunand, nor combinations thereof teach or suggest the invention as presently claimed in independent claims 1, 4, 7, 10, 13, 16, 19 and 22. As claims 2-3, 5-6, 8-9, 11-12, 14-15, 17-18, 20-21 and 23-24 depend, directly or indirectly on one of the foregoing independent claims.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1, 3 and 4 under 35 U.S.C. § 102(b) as being anticipated by Seeber. Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1-5 under 35 U.S.C. § 102(e) as being anticipated by Dunand. Applicant, accordingly, respectfully requests withdrawal of the rejections of claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Dunand.

Applicant respectfully submits that the present application is in condition for allowance. If the Examiner believes a telephone conference would expedite or assist in the allowance of the present application, the Examiner is invited to call Stephen De Klerk at (408) 720-8300.

Please charge any shortages and credit any overages to Deposit Account No. 02-2666. Any necessary extension of time for response not already requested

is hereby requested. Please charge any corresponding fee to Deposit Account No. 02-2666.

Respectfully submitted,

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Dated: May 16, 2006

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